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A program of individually prescribed reading instruction is described. The model to provide for this individualization consists of the following components: (1) sequentially established curricular objectives stated in behavior terms, (2) a procedure and process for diagnosis of achievement in terms of the objectives, (3) the necessary materials for individualizing learning to provide a variety of paths for mastering any given objective, (4) a system for individually prescribing the learning tasks that the student is ready to undertake, (5) the total school environment including teacher functions and school organization, and (6) strategies for continuous evaluation and feedback of information for teacher decision making. Date collection, record keeping, and the use of information by teachers are essential aspects of this program. Computer assisted management for this project will be in operation by September 1968. (KJ)

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INDIVIDUALLY PRESCRIBED INSTRUCTION -- READING PROGRAM

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OFFICE OF EDUCATION

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One of the major themes in education today is that of the "individualization of instruction." For the past 10 years or so, conventional systems of organizing the schools for instructional purposes have been under attack. Many innovations have been suggested and/or tried with the purpose of breaking the lockstep of the grade-level, more conventional programs. These include such innovations as: flexible scheduling, non-grading, team-teaching, programmed instruction, dual progress, advanced placement, coordinated education (a cradle-to-grave education) programs and many others.

Because of the importance of this problem and the potential contribution to educational practice that could result from any significant progress toward the development of procedures providing for many individual differences among students, the Learning Research and Development Center at the University of Pittsburgh is devoting major attention to this problem. A further basis for centering attention on this type of problem is the long-term research and experimentation commitment involved which the research and development centers, now being funded by the U. S.

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Office of Education, have the unique opportunity to investigate. An example of this long-term commitment is the development of curriculum materials and instructional procedures which must involve the close collaboration with practicing public school personnel, curriculum-development specialists, subject-matter scholars, and various types of behavioral scientists.

One of the projects at the Learning Research and Development Center that is primarily concerned with the problem of individualization is the Individually Prescribed Instruction (IPI) Project. Since the Fall of 1964, the University of Pittsburgh, in cooperation with the Baldwin-Whitehall School District, has been engaged in the development and implementation of this project in the Oakleaf Elementary School, an operating K-6 school. Under this cooperative arrangement, the teaching staff and student body normally assigned to this school serve as a part of the research and development team permitting this school to become a laboratory school for purposes of testing some basic hypotheses related to individualization.

The IPI Project represents an investigation into the problems encountered in individualizing instruction and involves the development of a program for achieving this goal. The definition of individualization that serves as a bases for the project is that individualization of instruction implies the provision for planning and implementing an individualized program of studies suited to each student's learning needs and his characteristics

as a learner. At the present time, the essential aspects of individualization that are of major concern to the project staff are: 1) individualization of rate at which students proceed through a carefully sequenced set of objectives for a given subject, 2) mastery of subject-matter content by individuals to enhance discovery or creativeness as they proceed through a set of objectives, 3) some self-direction, self-evaluation and, to a limited degree, self-initiation on the part of the learners and, 4) individualized techniques and materials of instruction. All these aspects are predicted upon the fact that individualized instruction entails determining what the child now knows in a given area and what he is now ready to learn.

The model to provide for this individualization is conceived of as consisting of the following components: 1) sequentially established curricular objectives in each area stated in behavioral terms, 2) a procedure and process for diagnosis of student achievement in terms of the objectives of the curriculum, 3) the necessary materials for individualizing learning to provide a variety of paths for attainment of mastery of any given objective, 4) a system for individually prescribing the learning tasks that the student is ready to undertake, 5) the total school environment including teacher functions and school organization and, 6) strategies for continuous evaluation and feedback of information for teacher decision making.

As presently operating, the project involves students for that portion of each school day set aside for study in the three basic content areas: 1) reading, 2) mathematics and, 3) primary science. For the remainder of the day students are engaged in study under procedures followed in most other elementary schools.

Since the major area of interest here today is that of reading, I will attempt to explain the reading program as now operating in terms of the six major components of the model.

The curriculum being implemented in the reading program represents an attempt to develop a curriculum based on a consensus of recent thinking in this field. After reviewing the alternatives available, the underlying approach adopted by the staff for the instruction of reading was a linguistic approach. This approach seems to suggest four stages of reading: 1) pre-reading, 2) decoding, 3) comprehension and skill development and, 4) independent reading. Generalizing, these stages proceed from decoding to utilization of the decoding system for the more comprehensive use of the word "reading." Although these stages represent a hierarchy of development, it should be pointed out that there is a great deal of overlap between the stages making it difficult to define where any stage ends and the next stage begins.

Insert Figure 1 here

In order to individualize instruction, it is important that a sequence of learning experiences be carefully defined and ordered to enable the teacher to diagnose the student's present competencies and assign him learning experiences he can manage. For this reason, it is necessary to express the curriculum in carefully defined objectives with each objective built upon those that preceded it.

The IPI Reading Curriculum contains approximately 400 behavioral objectives arranged into units and levels. Each of the units contain approximately 2 to 12 objectives relating to an area of study in reading with each level containing the units ordered into some logical structure. Each level represents a level of achievement at the end of a large sequence of work usually requiring several months to a year to complete. Figure 2 represents a scope and sequence chart indicating the number of objectives in each unit for the reading curriculum.

Insert Figure 2 here

Once the sequenced objectives in each of the units had been stated, diagnostic instruments were developed to measure the specific tasks to be learned. As presently operating, there are four general types of instruments being utilized: placement tests, pre-unit tests, curriculum-embedded tests and post-unit tests.

In reading, the placement tests, both oral and written, are administered at the beginning of each academic year to determine the starting point for each child in the curriculum. From the results of the placement tests, the teacher assigns each child a pre-unit test for a particular unit, e.g., F-Literal Comprehension or G-Evaluative Comprehension, etc. The unit pretests measure the child's proficiency for each objective within the unit. Mastery of any of the objectives within a given unit means that the child can skip these particular objectives and concentrate on the objectives for which he shows lack of mastery. Once the student has been assigned work in a given objective and indicates from his manipulation of the tasks that he probably has reached the desired proficiency of this objective, the teacher then assigns a curriculum-embedded test to check his proficiency. Mastery on this instrument indicates that he is ready to concentrate on the next objective within this unit. When the student has completed all the work assigned within a unit and the results of the curriculum-embedded tests indicate he has achieved the desired proficiency required for each objective, he is given a posttest covering all of the objectives within the unit. These posttests and the child's progress can be noted in terms of criteria established for this particular unit.

Materials for individually prescribed instruction have been selected and developed to teach each of the objectives. As much as possible, these materials have to be developed for some degree of self-study leading the child from what he knows to what he needs to know next to progress through the curriculum. Where possible

existing materials that meet these criteria are identified and when necessary modified for use in IPI. Where materials were not readily available or easily modified, the Learning Research and Development Center's staff and the teachers have developed the necessary materials. An example of the adaptation of commercial materials is the present use of the Cynthia Buchanan, Sullivan Associates, McGraw-Hill published, beginning reading program. In attempting to implement the first 14 or 15 books of this series in an individualized program, we found it necessary to develop approximately 500 short recordings to introduce sounds, new words, dictation exercises and other auditory requirements of the program. As a result of the work in adapting this program, we are now finding it feasible to reduce by approximately 50 percent the amount of work assigned in the 14 books as written.

Presently throughout the program there is considerable reliance on worksheets, tape and disc recordings, programmed materials, individual readers, selected materials from reading kits such as SRA, Macmillan Reading Spectrum and others, and manipulative devices such as the language master. Even with the emphasis on self-instructional materials, it should be pointed out that this is not the only instructional technique employed. In some instances, it is necessary and even desirable for the teachers to present new ideas and processes; this is done in small and/or large groups as well as individually. The major difference of group instruction as employed in an individualized program is that the groups are constituted for a particular purpose and usually only remain intact for short periods of time.

A major ingredient of the IPI system is the individual pupil's prescription or daily lesson plan. On the basis of the teacher's diagnosis of the student's abilities and placement, the lesson plan for each child lists the materials to be used and the instructional techniques to be employed for a particular objective. Generally the teacher's diagnosis includes such factors as: 1) the achievement of the student as it relates to the curriculum, 2) the general maturity of the child, 3) certain learner characteristics as they relate to the particular tasks and, 4) the student's present degree of self-direction and self-initiation. These prescriptions are prepared prior to the scheduled time for reading instruction and are organized for ease of distribution as the class begins.

In order to provide the necessary interaction of the various aspects related to the scheduling of IPI, the students are divided into two groups for the three areas of mathematics, reading and science. These groups are Primary which would be traditionally kindergarten, first, second and third grade and Intermediate, which is the fourth, fifth and sixth grades. This procedure is followed in order to better utilize the staff, clerical assistance, and materials for reading.

Currently there are 11 teachers and six clerks or teacher aides assigned to the project. Nine teachers are assigned to homerooms and are responsible for the teaching of non-IPI subjects, i.e., subjects other than math, reading and science. These nine teachers also serve as a nucleus for the program in IPI reading and are supplemented by a reading teacher who functions as a consultant as

well as serving as a librarian for each of the groupings of students. Reading is scheduled at least one hour a day, each day for each group. In order to share the additional teacher and clerks, reading for the two segments of the school are scheduled at different times.

The students in the primary reading program usually begin work independently on prescribed materials. In the case of a first grader working primarily in the decoding portion of the program, the student would begin work by listening to one or two records prepared to go with a series of student response sheets introducing him to new sound symbols, review sound symbols and introducing new words. After completing this oral introduction, he will then work in his reading book which at the present time is a modified version of the Sullivan Associates Programmed Reading materials. His prescription will generally tell him how far to proceed in this book before checking with his teacher. Most of the students can proceed through the prescribed materials with a minimum of teacher direction and instruction. However, when assistance is needed the student will ask for help and either the teacher aides or the teacher, depending on the nature of help needed, will assist the child so that he can proceed. When the child has completed this portion of his assignment, the teacher will generally bring together five to 10 students and conduct an oral reading program with them. The emphasis during the individual aspect of the program for these students would be on the decoding processes while the emphasis during the oral reading

portion of the period would be on evaluating the decoding aspect and instruction into the areas of comprehension and utilization of the decoding process.

In contrast to the primary program, the intermediate program is divided into two major areas -- that of 1) basic skill development and 2) reading skill utilization activities. During the skills development portion of the program, the student is provided a daily lesson plan known as a prescription based upon his placement in the reading continuum and the learner characteristics mentioned above. The student will work independently or in small groups with the materials developed to teach each of the objectives. For example, a student ready to begin work at Level E-Literal Comprehension, would be assigned a pretest covering the three objectives for this unit. These objectives are:

1. List in written form the events of a given story or article in the order of occurrence.

2. Answer, in written form, true-false statements that require recall of direct statements in a printed text.

3. Copy the sentence from a story which provides proof for the answer to a given question.

From the results of the pretest information, this particular child needed work assigned for Objective 1. On his prescription the teacher would list the tasks that are appropriate for him for this objective. These would be listed as: E-LC-1, page 2, 3, 4. The student would then go to the materials center and pull the sheets corresponding to these assignments. His first assignment as listed on assignment sheet 2 would be: "Go to the SRA Reading Laboratory 1C in the Learning Center. Find the story, 'Smart Little Rooster,' Olive 15 and read it. After reading it answer the questions listed below on this sheet." Upon completing this assignment the student would then check his answers against an answer key. If he has questions concerning interpretations or errors that he made, he would see the teacher. If he has no questions he would then procede to the next assignment. The next assignment might be a selection from a Basal reader such as New Streets and Roads. It often happens that the teacher gives the child a more open assignment within this objective permitting the student to read any three or four selections from the material available for this objective.

As the student is working through his assignments, the teacher usually moves throughout the class checking student progress and giving assistance as needed. The information gained from this interaction plus the information obtained from the child's success and difficulties with the assigned materials are the bases for the next days prescription. About one-half of the child's reading time is spent on activities just described. The other one-half of the

reading program the child spends in what can be referred to as the related reading portion of the program. During the reading utilization portion of the program, the student is involved in applying the knowledge obtained from the skills portion in the reading of library books, textbooks, magazines and newspapers. Presently, we refer to this portion of the program as directed, guided and independent reading. Depending upon the child's placement in the reading continuum, he is assigned to a small group where he is introduced to a variety of sources in reading, he shares interpretation of the same selection with others in the group, he is introduced to some of the classics of our literary heritage and is provided with opportunities for purposeful oral reading. Also, during part of this time, he is given the freedom to select what he wants to read and is given a choice as to how he wants to report on what he has read. The distribution of time spent in directed reading activities decreases as the child moves up to the higher levels of a continuum while the amount of time spent in independent reading increases as he progresses. The main difference between the extremes of directed to independent reading is the amount of teacher input and control of the child's reading activities.

In order to free the teacher for instructional decision-making, tutoring and evaluation of student progress, the scoring of worksheets, tests, etc., is either done by the teacher aides or by the children themselves. The teacher aides also assist the children in locating materials and performing other non-instructional tasks.

Data Collection

An essential aspect of individualized instruction is the provision for charting the progress of each student as he moves through the curriculum and the availability of these reports for teacher use. This information is necessary for individual prescriptions and classroom organization. The data to be used for prescription writing should include: 1) general ability level in the given subject, 2) the degree of mastery or lack of mastery in each skill in the particular unit assigned to the student, 3) information related to the child's progress in previous units directly related to the skills in the present unit, 4) detailed information related to the pupil's progress as he moves through the various tasks related to the particular skill or objective assigned and, 5) general learning characteristics of the pupil as they relate to the assigned task.

Information needed by the teacher for day to day classroom organization must include: 1) level, unit and skill of each pupil in the class, 2) the approximate length of time (days) the student has been working in a given skill and, 3) the next immediate skill for each pupil in the class. With this information the teachers can organize the classes for small and large group discussion, peer group discussions or individualized tutoring. The availability, accuracy and the format of these reports is a key ingredient to the success of IPI.

A program for computer-assisted management for the project is presently being developed and will be in operation by September of 1968. With the implementation of this management system, teachers will be able to obtain more quickly relevant information on a particular student, reports as to how many and which students are working in the same units or objectives, and daily summaries of the progress of each student. Additional functions of this system will be added as we are able to move the system into operation and train teachers to utilize the system more efficiently.

As indicated earlier, work on this type of problem demands a rather long-term commitment for development. Thus far, evaluation of the program has concentrated on information to assist in improving the program itself. Types of questions investigated to date include: Are the objectives properly sequenced? Which materials are not effective? Which tests are not providing the necessary information?, etc.

Assisting in this evaluation, Research for Better Schools, Inc., the U. S. Office of Education sponsored Regional Laboratory in Philadelphia, is field testing the project in approximately 20 schools to obtain data on the model in various settings to determine its reproducibility, cost factors involved, types of teacher training needed in the various settings and variables related to the implementation and monitoring of an individualized program. In general, what has been accomplished to date in the development of the program has convinced the staff that some degree of individualization of instruction is possible with this type of program.

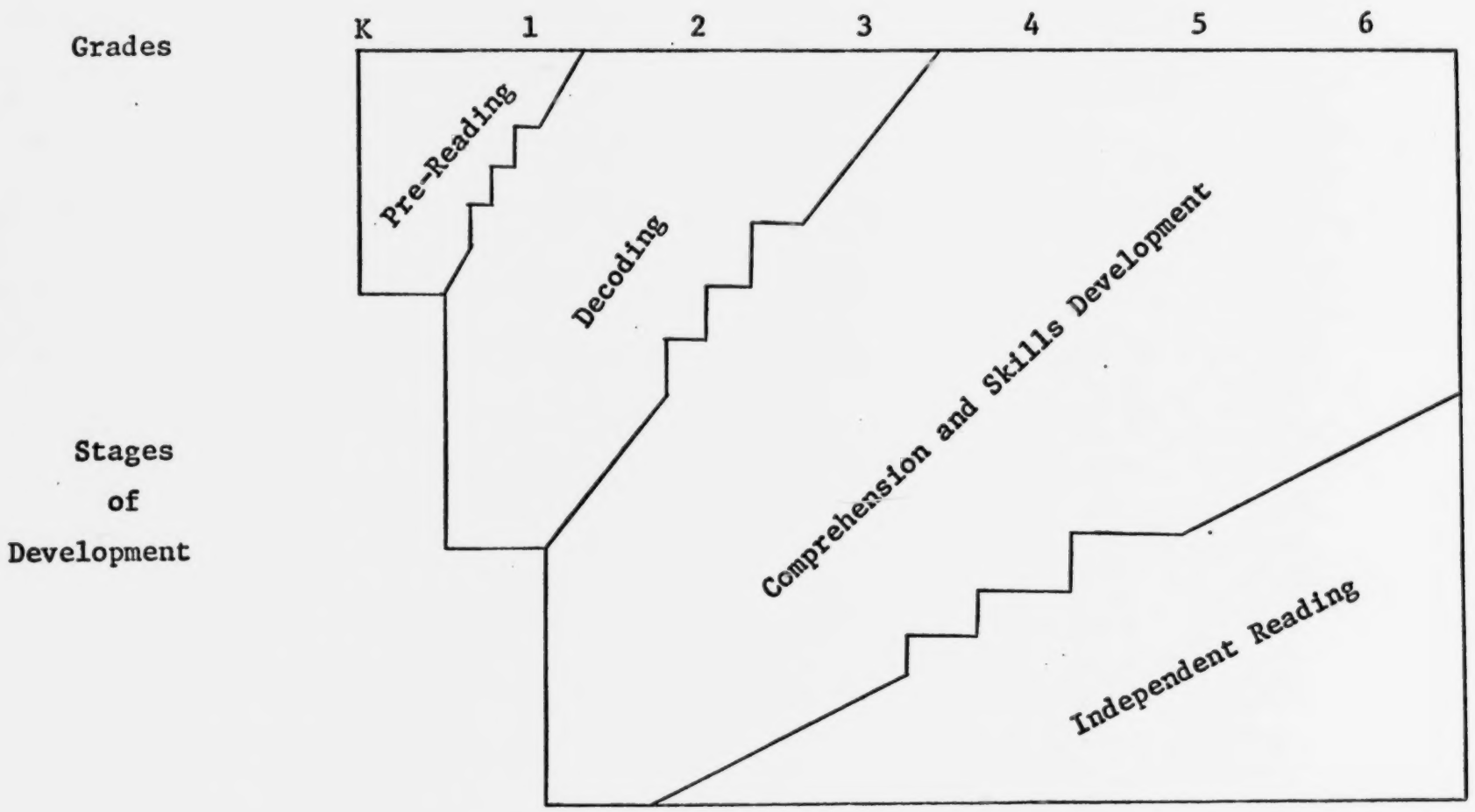

Figure 1

Graphic Representation of the Reading Program

Figure 2

Number of Objectives in Each Unit in
Individually Prescribed Instruction Reading

Subtopic	Level										
	A	B	C	D	E	F	G	H	I	J	K
Visual Discrimination	12	-	-	-	-	-	-	-	-	-	-
Auditory Discrimination	2	2	-	-	-	-	-	-	-	-	-
Phonetic Analysis	-	-	3	6	4	5	6	-	-	-	-
Structural Analysis	-	-	4	7	11	12	6	3	3	3	5
Vocabulary Development	-	4	4	4	3	3	5	2	4	2	2
Literal Comprehension	5	4	4	3	3	4	4	5	3	2	2
Interpretative Comprehension	5	8	5	5	3	4	5	6	6	5	8
Evaluative Comprehension	2	3	4	2	5	4	4	5	4	2	5
Organizational Skills	-	-	-	-	-	7	5	3	6	5	6
Library Skills	3	2	3	2	2	4	6	5	5	2	-
Reference Skills	-	4	1	3	4	7	6	5	4	4	2
Oral Reading	-	2	1	1	-	-	-	-	-	-	-
Rate of Reading	6	4	2	-	-	-	-	-	-	-	-